FEMA 339 / March 1999

## Building Performance Assessment Report

# Hurricane Georges In Puerto Rico

## Observations, Recommendations, and Technical Guidance


Federal Emergency Management Agency
Mitigation Directorate
Washington, DC,
Region II, New York, NY
and the Caribbean Area Office

## The Building Performance Assessment Process

In response to hurricanes, floods, earthquakes, and other disasters, the Federal Emergency Management Agency (FEMA) often deploys Building Performance Assessment Teams (BPATs) to conduct field investigations at disaster sites. The members of a BPAT include representatives of public and private sector entities who are experts in specific technical fields such as structural and civil engineering, building design and construction, and building code development and enforcement. BPATs inspect disaster-induced damages incurred by residential and commercial buildings and other manmade structures; evaluate local design practices, construction methods and materials, building codes, and building inspection and code enforcement processes; and make recommendations regarding design, construction, and code issues. With the goal of reducing the damage caused by future disasters, the BPAT process is an important part of FEMA's hazard mitigation activities. For more information about the BPAT program or if you are interested in becoming a member, please visit our website at www.fema.gov/mit/bpat.

Throughout Puerto Rico, the BPAT visited communities where people had lost their life's belongings and literally did not have a roof over their heads. The team was struck by the dignity of those individuals who had suffered great losses and appreciated the courtesy and hospitality that was extended to them. The team also appreciated their patience with the BPAT's questions. This report is dedicated to these individuals, their families, and their friends. Their remarkable spirit is summarized by the saying "*al mal tiempo, buena cara*", which translates as "hard times, strong faces".

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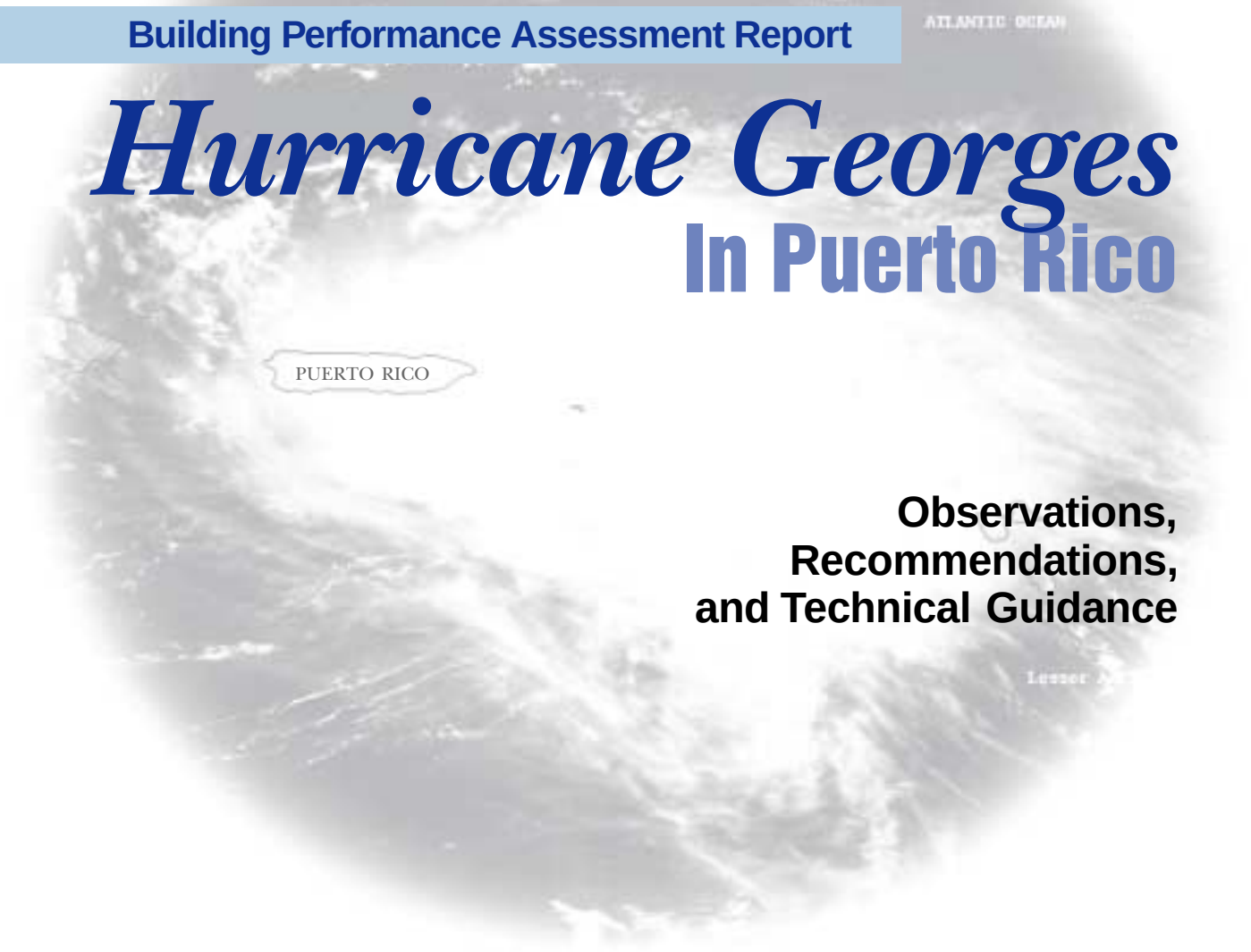
# *Hurricane Georges*
## In Puerto Rico

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# List of Acronyms

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|---|---|
| A-Zone | Special Flood Hazard Areas, excluding V-Zones |
| ACI | American Concrete Institute |
| AISC | American Institute of Steel Construction |
| ARPE | Administración de Reglamentos y Permisos (Regulations and Permits Administration) |
| ASCE 7-95 | American Society of Civil Engineers Standard 7-95 *Minimum Design Loads for Buildings and Other Structures* |
| ASD | Allowable Stress Design |
| ASOS | Automatic Surface Observing System |
| ASTM | American Society for Testing and Materials |
| BFE | Base Flood Elevation |
| BOCA | Building Officials and Code Administrators |
| BPAT | Building Performance Assessment Team |
| CAV | Community Assessment Visit |
| CIAPR | Colegio de Ingenerios y Agrimensores (College of Engineers and Surveyors) |
| CMU | Concrete Masonry Unit |
| EIFS | Exterior Insulating Finishing System |
| EO12699 | Executive Order 12699 |
| EO11988 | Executive Order 11988 |
| EPS | Expanded Polystyrene System |
| FEMA | Federal Emergency Management Agency |
| FIRM | Flood Insurance Rate Map |
| HVAC | Heating, Ventilation, and Air Conditioning |
| IBC | International Building Code |
| ICBO | International Conference of Building Officials |
| in | inch |
| LRFD | Load and Resistance Factor Design |
| mb | millibars |
| mph | miles per hour |
| NEHRP | National Earthquake Hazards Reduction Program |

| | |
|---|---|
| NFIP | National Flood Insurance Program |
| NOAA | National Oceanic and Atmospheric Administration |
| NWS | National Weather Service |
| psf | pounds per square foot |
| SBC | Standard Building Code |
| SBCCI | Southern Building Code Congress International |
| SFHA | Special Flood Hazard Area |
| UBC | Uniform Building Code |
| V-Zone | An area of special flood hazard extending from offshore to the inland limit of a primary frontal dune along an open coast and any other area subject to high velocity wave action from storms or seismic sources |